In re Patent Application of:
PIKE ET AL.
Serial No. **09/741,754**
Filed: **December 19, 2000**
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In the Specification:

Please amend the paragraph beginning at page 1, line 14 as follows:

As the density of active devices on typical integrated circuits has increased, dissipation of the heat generated has become ~~increasing~~ increasingly more important. Designers have developed cooling techniques for integrated circuits based on micro-electromechanical (MEMs) technology.

Please amend the paragraph beginning at page 1, line 20, as follows:

For example, as shown in FIG. 1, a prior art electronic device **10** includes a package **11** including a first member **12** comprising silicon, and a second member **14** comprising a low temperature ~~co-fied~~ co-fired ceramic (LTCC) material. The first member **12** may include several stacked silicon substrates **12a, 12b** having various components of a micro-fluidic cooler formed therein. For example, as shown in the illustrated embodiment, an evaporator **16** and condensor **17** may be provided and interconnected via one or more micro-fluidic channels or passageways **21** formed between the silicon substrates **12a, 12b**. One or more MEMs pumps, not shown, may circulate the cooling fluid.

REMARKS

The Applicants thank the Examiner for the thorough examination of the present application. Claims 1-20, directed to the non-elected invention, have been cancelled without prejudice to Applicants' right to file a divisional application directed to the subject matter thereof. Claims 21-34 remain in this application.

The specification has been amended to correct the noted informalities, as helpfully pointed out by the Examiner.

The Examiner has objected to the specification and noted that the terminology "low temperature co-fired ceramic (LTCC)" has not been described in the disclosure in detail. More specifically, the Examiner noted that the disclosure gave no example of the types of materials that meet the requirement. Applicants submit that one skilled in the art would be familiar with LTCC material without further explanation. In fact, at least two of the references cited in Applicants' Information Disclosure Statement disclose the use of LTCC (see U.S. Patent No. 5,600,541 to Boone et al., and U.S. Patent No. 5,611,876 to Newton et al.). Accordingly, Applicants request that this objection be withdrawn.

The remarks supporting patentability of the claimed invention are found below.

I. The Invention

The invention, as recited in independent Claim 21, is directed to an electronic device comprising a first member and a second member. The first member comprises silicon, and the second member comprises a low temperature co-fired ceramic (LTCC) material. The first and second members have opposing

surfaces thereof anodically bonded together to form a hermetic seal therebetween.

Independent Claim 30, further recites that the first member has at least one first micro-fluidic cooling structure therein, and that the second member has at least one second micro-fluidic cooling structure aligned with the at least one first micro-fluidic cooling structure of the first member. Independent Claim 30 further recites that the electronic device further comprises at least one integrated circuit adjacent the at least one second micro-fluidic cooling structure.

II. The Claims Are Patentable

The Examiner rejected independent Claims 21 and 30 over U.S. Patent No. 5,892,279 to Nguyen. Applicants submit, however, that the Examiner has mischaracterized the Nguyen patent.

The Nguyen patent discloses an integrated gate bipolar transistor comprising a first copper layer forming a common collector pad, and a gap separating the common collector pad from an emitter pad. The collector pad and the emitter pad are mounted to a substrate, which includes another copper layer.

The Examiner cites column 8, lines 2+ of the Nguyen patent in contending that Nguyen discloses a first member comprising silicon. This section of the Nguyen patent discloses that the transistor may be coated with a "silicon gel". Applicants submit that this is a clear typographical error, and that the Nguyen patent should read that the transistor "may be coated with a ***silicone*** gel". The Examiner,

and other skilled artisans, are sure to know that silicon is an element, and silicone is a sealing compound, and that silicon is not normally found as a gel.

More specifically, silicon is a tetravalent nonmetallic element that naturally occurs, and is used especially in alloys and electronic devices (Merrriam-Webster Dictionary). Silicone, however, may be any of various polymeric organic silicon compounds obtained as oils, greases, or plastics and used especially for water-resistant and heat-resistant lubricants, varnishes, binders, and electric insulators (Merrriam-Webster Dictionary). Accordingly, Applicants submit that the Nguyen patent fails to disclose a first member comprising silicon material.

Applicants further assert that the Nguyen patent discloses a solder bond between the first and second members (FIG. 9 and column 5, lines 1-10). Accordingly, Nguyen fails to disclose that first and second members have opposing surfaces that are anodically bonded together to form a hermetic seal therebetween.

Applicants therefore submit that independent Claims 21 and 30 are patentable. Their dependent claims, which recite yet further distinguishing features, are also patentable, and require no further discussion herein.

CONCLUSIONS

In view of the arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is

encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: COMMISSIONER FOR PATENTS, ALEXANDRIA, VA 22313-1450 on this 8th day of September, 2003.